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Science and Art Gossip.

A contemporary takes us to task, though not unkindly, for saying that the death of a novelist is a more serious calamity than many about which more is said. But is it not true? We said in reality the death of such a man, not meaning a novelist specially, because the death of a great historian, dramatist, poet, man of science, actor, singer, and so forth, belongs to the same category—unless death comes in the fulness of a man's years, when all his work has been done. Are there not men much higher in position, whose death causes much more talk, who yet pass away and are not missed at all by the world at large? A great statesman's death may, like Cavour's, be seriously felt by a nation, yet not often. A king dies and another succeeds, the only change generally being that the boot-lickers transfer the virtues of the dead to the living, and suddenly find the dead king was not so very good or great after all. The "first gentleman in Europe" is recognised (first by the dust-swallowers, *always*) as rather low-lived, to say the least of it, while one who had been thought less than little of becomes "our gallant sailor king;" he dies in turn, and a Greville publishes three volumes describing a half-crazed person, father of a large family, yet "no son of his succeeding." But when a Thackeray dies who can replace him, who can even complete his last unfinished work? When even a Garrick dies, it can be truly said that "the gaiety of nations" is eclipsed.

Mr. Ruskin has said that our English middle and lower classes—we are not sure he has not extended the remark to the upper classes—behave like boors, while the peasantry of some continental countries have the bearing of noblemen. It may be true, though possibly he should not have said it. Anyway, mere bearing is not a matter of so much importance as kindliness of heart. We wonder, though, what he would have thought of the bearing (not so much boorish as brutal) of a number of persons, disguised as gentlemen, who proposed to attend his lecture on "Cistercian Architecture" at the London Institution. The lecture-room was full nearly an hour before the lecture began, and many ladies, a few gentlemen, and the persons we refer to, were unable to gain admittance. Three ladies fainted, and an appeal was made to those who stood in the passages to make way while they were carried out. But while the few gentlemen present did all they could to assist these ladies, the more numerous brutes wilfully blocked up the way, which it was easily within their power to have cleared. They also talked and laughed and disturbed the audience so disgracefully, that at last the doorkeepers had to do what (with a knowledge of the ways of this set, they should have done earlier) to close the doors, and deprive the ladies and gentlemen outside of such small satisfaction as they might have had in hearing the lecturer's voice.

Doctor Henry Draper's death has caused much sorrow among his fellow-workers in science in America. That he was not appreciated at his full worth here is shown by the fact that when his name (among the very worthiest) was recommended for an Associateship of the Astronomical Society, it was rejected in favour of some certainly not worthier. It should be known, however, that the opposition came from a *clique* who seem to think that the recognition of skill or success in solar research in any but the high-priest of the sun-spot religion, and still more the admission of a discovery inconsistent with his views, would be most blameworthy.

As with poor Buckle, so with Henry Draper. He sorrowed most in death for the work he had to leave unfinished. "I have fought hard," he said, "but it is of no use: I must go." For many a long day science will feel the premature loss of this zealous worker.

Mr. R. H. Mushens, Secretary of the Sunderland Provident Dispensary, writes to us that he has submitted to the principal railway companies an Ambulance Emergency Case, "specially designed to meet the requirements of railway accidents," but, as yet, the result has been *nil*. It would be well if a law were passed ruling that in every train three cases containing splints, lint, plaster, sponge, tourniquet, bandages, &c., should be carried (under certain penalties in case any accident occurred, and injured passengers suffered for want of these things). The cost of such cases would be little, their value great.

"The interviewer," writes Mr. Freeman, in *Longman's Magazine*, "who questions you simply in order to print your answers in a newspaper, is, as far as my experience goes, purely American. The process is not always pleasant; for the questioning consists largely in asking for one's impressions on various American matters, and especially on points of likeness and unlikeness between America and England. It is certainly odd that, when so many American papers are always assuring the world that they do not care for British opinion, they should still be so untiringly anxious to find out what British opinion is. And the questioning on these points sometimes puts one in an unfair dilemma. If one blames anything, one, of course, runs an obvious chance of giving offence. And if one praises anything, one runs the chance of giving offence on the subtler ground of being thought 'condescending' and 'patronising.'"

"On the whole, I got used to the interviewers," Mr. Freeman proceeds; "and I was specially charmed with the moral portrait of me which was given by one of them at

St. Louis. From him I learned that, when I don't know a thing, I say that I don't know it; and that, when I do know a thing, I speak as if I were quite certain about it. To the interviewer, as I gathered from his report, this way of acting seemed a little strange, though he clearly approved of the eccentricity. To my own mind, the puzzle would be why any man should either pretend to know a thing which he does not know, or pretend not to know a thing which he does know."

In the *Zeitschrift für Analytische Chemie*, Tjaden Moddermann remarks that he has for some time been accustomed to prepare pure sulphuric acid by recrystallisation of the hydrate ($H_2SO_4H_2O$), and finds this seldom-adopted method of purification to be really an excellent one. The author has experimented in this way upon acids containing considerable quantities of lead and arsenious and nitric acids, &c., and by protracted recrystallisation has in all cases obtained a pure acid from them. The method is very simple. The acid is mixed with sufficient water, and, in bottles two-thirds full, exposed to the cold in the open air on a frosty night. If the mixture has been properly made, it is generally frozen throughout the next morning. The chief thing then is to carefully separate the crystals from the mother liquor, and for this purpose the author employs a centrifugal apparatus, so constructed that the acid only comes in contact with glass. The separation is very easily effected, and, except in cases where an acid is strongly contaminated with the different oxides of nitrogen, one recrystallisation is generally sufficient.

According to statistics compiled by the Agricultural Bureau, at Washington, the annual meat product of the United States is in round numbers :—

	Number.	Pounds.
Dressed hogs	29,000,000	5,120,000,000
Beeves...	6,250,000	3,124,000,000
Veals.....	3,000,000	275,000,000
Muttons	7,000,000	350,000,000
Lambs	5,000,000	100,000,000

About one-fourth of the pork and one-twelfth of the beef are exported, leaving for home consumption about seven thousand six hundred and fifty million pounds of the above meats, mostly beef and pork ; or an average of almost half a pound a day for every man, woman, and child in the country.

At a meeting of the Manchester Geological Society, Mr. C. E. De Rance, of the Geological Survey, read an interesting communication with reference to an important discovery of manganese ore near Abergele, in Denbighshire, occurring in the old red sandstone. The deposit, he explained, occurred in a bed, and not in a vein, as in the ordinary way, and reached a thickness of 17 ft. of solid ore. The deposit had been opened out by the Abergele Hematite Company, and its existence had previously been so little suspected, that the ore had actually been used for paving purposes. He was of opinion that close investigation of similar localities throughout North Wales would lead to the discovery of other deposits of like nature, which would be of great value, considering the present demand for manganese for the manufacture of Bessemer steel by the Spiegeleisen process. The source of this ore, he was of opinion, was the basement beds themselves, the metal being concentrated by the percolation of water downwards, until arrested by the impermeable floor beneath.

The Captain-General of the Philippine Islands telegraphs from Manilla that on the first day after the recent hurricane, which almost entirely destroyed the town, not a single case of cholera occurred in Manilla or the island. The tornado not only swept over the entire archipelago, but was felt many hundred miles out at sea, especially to the south and west. It is believed that more lives have been lost by shipwreck than on land.

They have a curious way of clearing away wrecks in Ireland. Recently an attempt was made to blow up the steamship *Silkstone*, which had sunk in the Suir, opposite Waterford Quay. The force of the explosion was so great that the windows in every house on the quay, the principal street in the city, were smashed to pieces, and goods and articles of furniture dashed about the shops and houses in every direction. So great was the amount of damage done, that the shutters were put up in every shop. Nor did the windows in the upper stories escape. Several shop assistants were knocked off their legs. A *Times* correspondent says the principal business concerns of the city have been completely wrecked, but leaves it to be inferred that the "*Silkstone*" remained monolithic.

M. Dumas recommends water saturated with alum for extinguishing fires, its value being supposed to be due to the coating it gives to objects wet with it, which prevents contact with the oxygen of the air, and thus diminishes the rapidity of the combustion. The Minister of the Interior has recommended that the firemen of the French towns be supplied with facilities to use such solutions of alum.

An automatic electrical appliance for giving notice of the approach of trains, invented by M. Mors, has, says the *Engineer*, been successfully tried on the Paris-Lyon-Méditerranée line. It consists of a box filled with mercury placed under the rail at the required distance from a bell ; the trepidation caused by a train passing over it agitates the mercury, and forms contact with the wire communicating with the bell, thus causing it to ring.

A Broker's office in Wall-street, New York, having a leased wire, sent up a message to 195 on the morning of the big electrical storm to know what was the matter with their wire. Chief Operator Bogart replied that the "aurora" was on it. The firm thereupon telegraphed back to have it cleared off immediately, as they wanted to use the wire.—*Operator.*

During the discussion at a recent special meeting of the Town Council of Newcastle-on-Tyne, one of the speakers said that Liverpool had spent £15,000 on electric lighting experiments, and then rejected a proposal to apply to the Board of Trade for a provisional order.

At a meeting in New York, on Nov. 21, of the shareholders of the Edison Company for Isolated Lighting, a report was read of the business done by the Company during the year ending Nov. 19. In this period, 137 installations had been fixed, the total number of lamps in use being 25,751. A dividend at the rate of 14 per cent. per annum was declared.

There is a charming article about cricket in *Longman's Magazine* for January. It is from the pen of Mr. Murdoch, the captain of the Australian eleven.

A NATURALIST'S YEAR.

By Grant Allen.

III.—THE MISLETOE BOUGH.

Of course, everybody has a bit of misletoe in his house just at the present moment; and therefore I feel sure I could have no better text in the world on which to preach my Christmas sermon than its forked branches and its semi-transparent white berries. So I stick a spray of the uncanny green thing in the little red Japanese vase before my eyes as I write, and I strongly advise you to do the same, as a sort of check or reference, while you follow my didactic exposition. Misletoe, we all know, is a parasite; and yet there are many worse parasites in the world than that pretty green-leaved plant, with its strange angular forks and its graceful bunch of pale white fruitlets; for you observe at once that it has foliage of its own. Now, regular thorough-going parasites, such as broomrapes and dodder, have either no leaves at all, or else have them reduced to mere functionless scales upon the tall, naked flower-stem. Naturally, as soon as a plant has begun to live entirely upon organised material stolen from other and more industrious accumulators, it has no further need for leaves of its own. Misletoe, however, though a very old parasite (as shown by the fact that it belongs to a numerous parasitic family, rich in species, especially in the tropics) has never acquired such habits of complete sponging as these very degraded leafless plants. It has a little honesty left in it still. Yet if you read any of the old-fashioned books about botany, you will be told that misletoe is a complete parasite, while dodder is an incomplete one. The phrase and the distinction which it implies have descended to us from times when vegetal physiology was less understood than at the present day; but people go on using them still in a somewhat unthinking fashion, though the progress of knowledge has exactly reversed our ideas as to the true state of the case. Let us look a little at the origin and functions of the misletoe, and we shall then see how far it has really become degraded to parasitical habits.

I don't know whether you will be able to find a single belated flower upon your misletoe bough, though I am afraid there isn't much chance so late in the season as this; for the plant generally blossoms early in the year. But whenever you do come across one in flower, you will find that it points back to an ancestor not unlike the common dogwood. The little blossoms are stuck close in the angles of the branches, where they fork, and they are of two kinds, male and female, each growing on a separate plant. The male flowers consist of a very small calyx, enclosing four minute petals, with a stamen fastened on to the middle of each in a very close fashion; and they grow in little groups of four or five together, surrounded by a cup-shaped bract. The female flowers, again, consist of a calyx which has grown into one piece with the berry, and of four extremely tiny petals. Like the males, they are surrounded by a bract, but they generally grow solitary within it, or at most, by twos and threes. All these peculiarities show that the misletoes are a very ancient, though much degraded, type—that they have long been started on a special course of development apart from their nearest relatives; and this is still better seen in some of their tropical congeners, which have the stamens reduced to two or one, and the petals entirely wanting. But the indications they give us are clearly these—that the misletoe group are immediately descended from ancestors with a four-lobed calyx, four petals united into a single corolla, four stamens, and an ovary combined with the calyx. All the other special marks of the genus—its separate sexes, its stalkless stamens, its inconspicuous calyx, its peculiar mode of fertilisation—have been acquired at a later date than the beginning of its parasitic habit.

The hypothetical ancestor of the misletoe tribe, then, must have been a free bush or shrub, growing in the soil on its own account, and very much like cornel or dogwood. At the same time it must have closely resembled the sandalwood family, of which we have one rare English example, the small white bastard toadflax which grows among the chalky pastures of our southern counties. Only, the sandalwoods have entirely lost their petals, while many of the misletoe group still retain them. In other respects, however, the sandalwoods have varied less from the primitive type than the misletoes. At the same time, it is an interesting fact that several of them have also acquired semi-parasitic habits, as is the case with our own little bastard toadflax, which fastens itself by little suckers on to the roots of other plants, and derives nourishment from the sap in their tissues. This would seem to show that a parasitic tendency existed in the common ancestor of sandalwoods and misletoes even before they began to split up into two groups in different directions.

The misletoes, however, struck out a new line for themselves; instead of merely fastening themselves on to the roots of other plants, they took to an aerial existence upon their trunks and branches. For this rôle, their peculiar fruit specially adapted them. The bastard toadflaxes bear small one-seeded nuts, adapted only for falling out upon the ground, and, therefore, ill fitted for such a life as that to which the true misletoes have accommodated themselves. A plant so circumstanced, with a parasitical tendency already ingrained in it, can only fix upon its destined host by means of root-suckers. But the misletoe tribe bears one-seeded coloured berries, instead of green nuts; and this habit, which is probably of great antiquity in the family, since it is common to all its members, has made an aerial existence peculiarly easy for them to follow. Birds naturally eat the berries, and thus carry them from tree to tree, dispersing the seeds with their droppings on the branches, where the future plant is to gain its dishonest livelihood. In our own English misletoe, and in most others, the pulp of the berry is very glutinous indeed, being in fact the stuff employed in making bird-lime; and from its Latin name *viscum* we even get our English adjective "viscid." Now, this viscidity clearly helps the plant in accomplishing its felonious purpose, for it ensures the seed sticking wherever it may be dropped; and, in all probability, the berries are often carried clinging to the legs or wings of birds, and then rubbed off at the exact place where the young plants grow best, in the angles of the branches. It is significant, too, that our own kind at least is found most frequently on trees which bear fruits or berries, and especially on the apple, which are just the ones frequented by frugivorous birds; while conversely, it is extremely seldom found on nut trees, such as the oak, its rarity in these situations being the very thing which gave an oak-misletoe special sanctity in the eyes of the Druids (if, indeed, we know anything at all about them). Yet so little does the world at large discover about nature at first hand that I don't doubt ninety-nine people out of a hundred in England still firmly believe that misletoe grows exclusively on oak trees.

When the little hard seed, surrounded by its glutinous pulp, has thus gummed itself firmly on to the bark of the apple bough, it begins to sprout vigorously on its own account, and to fasten its blunt root on to the tissues of its host. However it may happen to be stuck on, the radicle or sprouting rootlet bends downward or outward towards

the supporting tree, exactly as though it knew where it must fix itself. Then the root-end flattens out into a sucker, and soon, piercing the bark, buries itself in the living tissues of its host. As it grows, its veins become almost continuous with the apple's, and its base becomes a broad flap, drinking in the proper elements of the sap from the vessels of the bough beneath. At the same time it is no mere lazy parasite of the worst type; for, after it has sprung up a little, it begins to put forth its yellowish-green opposite leaves—thick, leathery, oblong things, with hardly any look of life about them, but still containing lots of chlorophyl inside them, which enables them to assimilate material on their own account from the outer air, and thus leaves them partially independent of the hospitable apple. The leaves are evergreen, too, so that the plant can ripen its fruits in winter, while its deciduous-leaved host is bare and leafless. Such habits are very different from those of dodder, which never possesses any foliage of its own at all, but simply fastens its suckers on to the stems of gorse or heath, and steals from them every atom of the material from which it manufactures its twining red stems, its pretty pink flowers, and its numerous seeds—indeed, some few exotic members of the misletoe family are not parasitical in any way, though in these cases it seems more probable that they have gradually lost their sponging habits than that they never acquired them at all.

BICYCLES AND TRICYCLES;

WHAT ENERGY IS REQUIRED TO DRIVE THEM.

By John Browning.

THE conclusions arrived at on this subject by Dr. Johnstone Stoney, as quoted in a recent number of Knowledge seem to me to require so many qualifications and corrections that I trust the Editor will allow me to state the results of my own experience in the matter, as I think they will at least throw some additional light on the question, if they do not furnish a complete answer to it.

Bicyclists in fair practice think but little of riding 100 miles in twelve hours. The number of those who have accomplished this is now so great that the cycling journals have ceased to publish the names of the riders as they used to do. The distance of 100 miles has been ridden by a bicyclist on an ordinary road in a trifle over seven hours.

The distance of 100 miles in a day has now been accomplished by many tricycle riders; several riders in my own club have done it without any severe exertion, while 180 miles has been ridden over a mountainous road in twenty-three hours forty-five minutes. One member of my club, over 70 years of age, has ridden forty miles in a day, though he has only recently taken to riding. A gentleman residing at Brighton, who has ridden ever since the introduction of the tricycle, though nearly 70, easily rides sixty miles in a day.

I do not consider myself at all a strong rider. I am above fifty, and I have never had any continuous practice, yet this year I have ridden fifty-six miles in eleven hours, over roads rotten with rain, without ever tiring myself, and on one occasion I left off after riding forty-six miles, feeling fresher than I did when I began. I have since tried how far I could ride in a day, but feel sure, with a little preliminary practice, that I could accomplish eighty miles without unduly exerting myself. No one who knows me would speak of me as an athlete.

What can be done by athletes was shown by Lowndes, who rode fifty miles, over an exceedingly hilly road, winning the Tricycle Championship in 1882, in three hours, forty-seven minutes, and Marriott, who won the second prize, who was only three hours, forty-nine minutes in covering the same distance.

I am quite unable to understand the distinction Dr. Stoney draws between the bicycle and tricycle, when he says that the exertion required to drive a bicycle is just below, while that required to drive a tricycle is just above, the amount which produces perspiration. Though I seldom rode a bicycle faster than eight miles an hour, I never rode without perspiration, and this is the experience of every bicycle rider known to me.

A little consideration will show that no hard and fast line can be drawn as to the perspiration point, as it will vary with the weight and friction of the particular machine, and with the inclination and roughness of the road, as well as with the habit of body of the rider.

CORSET PHILOSOPHY.

I WAITED till this week for your promised pictures of ancient statues which were to prove how women ought to dress now; but as they are postponed, I send you some remarks on your paper of Dec. 1; and will carry Dr. Chadwick's recommendation to you to dress up one of the statues of Venus a little further, by saying it should be modern dress; for I suppose you hardly expect to convert our ladies either to Grecian drapery, or to the usual costume of Venus. It may save you trouble to mention that you will find a copy of the result of that very experiment in the book on "Figure Training," which is said to have converted the maker of it into a believer in stays, though it probably will not you.

I almost think you must have intended to make fun of the Dress Reformers by assenting to practically all my facts, and adding some analogies of your own, which all support my conclusions, when properly understood. Thus, you serve up once more that antiquated dish of Chinese ladies' feet, which are maimed when young by doubling the toes under them, so that they can never walk again; and you add a little new sauce by telling us that they "often retain fairly-good health to an advanced age," nevertheless. You mean "fairly-good" in those respects in which it is not bad and ruined. For I suppose you do not call people in "fairly-good" health whose limbs are disabled by chronic rheumatism or temporary gout, because they may have no other ailment, and gouty men often live the longest. The "crushed heads" of some savages are also a fatal analogy for the anti-corsetites; for if they do no harm, they prove that a far more dangerous looking compression than tight-lacing may be harmless if done judiciously. If they do harm, then they are like the maimed feet, and entirely unlike tight-lacing, which is proved by long experience to do none, except in excess, as everything does. As to what is excess, I find there is a curious concurrence among the professors and confessors of both sexes in favour of contraction to seven or eight inches below the natural size for the time, though, of course, the results vary widely, and by no means all tight-lacers go as far as that.

It looks plausible enough to say that, because binding up a wrist or a knee for a long time weakens it, contracting the waist must weaken the stomach and the back. But if it must, it does, and there ought to be no difficulty in proving it by itself and not by analogical guesses; but nobody does prove it, and a multitude of people have proved just the contrary to their own satisfaction, and they must know better than you can whether they are

better or worse for it. It is idle to guess that they are "weaklings," and no fair specimens of the human race. They and their friends know and say that they are not at all so, and give all manner of proofs of it. If you ask what can make the difference between stomachs and wrists or knees, you may possibly remember that one is hollow and the other solid; one has to bend continually and the other has not, except in certain work and exercises, for which tight lacing is found to be unfit, especially for men, who breathe lower down than women. Some of the most severe female tight-lacers say that they take a great deal of exercise, and every one knows how they can dance for hours, besides riding and walking as briskly as any girl of the "Bunch" order, whom Sydney Smith likened to a mile-post.

Another of your funny analogies was that we might as well argue that everybody should wear a truss because it is necessary for persons with a particular ailment, as that everybody should wear stays because they are necessary to some people. But who ever did say so? Not I. The figure-reformers denounce corsets altogether, except for some invalids. I answered that they have never proved anything against them, and that no arguments of theirs are worth anything against the experience of those who declare they have found tight-lacing in stiff stays pleasant, useful, and beneficial in a variety of ways. If it does no more than preserve and improve their figure and carriage, and expand the chest, or even only makes their dress fit and look better, that is answer enough to those who can prove nothing against it; and would be so if it ever cured indigestion, or prevented corpulence or any other real evil.

We happen also to have had now some experience the other way. For about a dozen years before the *Lancet* began to be alarmed at the evident revival of tight-lacing, it had been very much out of fashion with both sexes, and what was the consequence? Women were losing their figures, and growing round-shouldered, and fat, and old prematurely. Somebody invented the euphemism of the "Grecian bend," to palliate it. But even that, and all your statuesque arguments and others (for they are all old enough) did not prevent women from seeing that they were wrong, and that the corset is a real necessity in our artificial way of life, though savages and hard-workers can do well enough without it. I have read several times that even Turkish ladies have taken to it at last, though they are obliged to conceal it by their dress; as a good many of the male tight-lacers said they did, until fashion set them free again to show it. Advertisements of various new corsets reappeared in all the illustrated papers, and shoulder and neck-straps were invented to help girls to be upright; from which it is clear that nothing is so good as tight-lacing over the old-fashioned perfectly stiff busk in front, besides its being better for the health, as several have written. Exercise alone will not always succeed, as any one can see by observation among his own acquaintance.

I agree with you that wide hips under a contracted waist look ill for men. Hips anything near as wide as the chest are a defect in men, and are a female characteristic. Consequently, actresses who affect male dress only look like ill-made and weak young men. Width all over may be a good form for rowing races, and perhaps for a Hercules or a coal-heaver, but not for a Jason or Apollo, as you say truly that the sculptors know full well; and it is not more the form of activity than thick ankles or large feet, nor the shape which any man desires or admires. Your own case proves that a young man with an unusually large chest may have a waist of only 28 in., just two-thirds of his chest, which I gave, and rightly, as a full size for a well-made young man of ordinary general size. Unfortunately, hips cannot be narrowed artificially, and therein women have a great advantage in figure-making over men. But they can be made to look worse by wearing trowsers loose over the hips, with large pockets, which the dandies of thirty or forty years ago never tolerated. It is true that men generally require waist contraction much less than women, though there has been ample proof that they often benefit by it in the same ways. Even if they only like it, or do it to improve their figure and dress, and consequent appearance, that gives pleasure to other people as well as to themselves, and I can see no kind of reason against it. Yet nobody can be more impartial than I am, as I never had the smallest pretence to a good figure myself, though I had more than average strength generally, and was fond of using it. But I have always admired those who have that much valued gift of a naturally good figure, male or female, and make the best of it; and so I find does everyone practically, when he sees such persons, however he may theorise about it and profess to believe that they owe nothing to artificial assistance.

Dec. 8. An Observer.

STAYED WEAKNESS.

By Richard A. Proctor.

I MUST leave to next week the continuation of my remarks on the Corset as an Aid to Philosophy, which will involve the response to most of "An Observer's" remarks; but, to avoid the inconvenience of including irrelevant matter in a set article, I may make now the following comments on some of the livelier portions of his rejoinder:—

1. I can very well believe, though I have not seen "Figure Training," that modern costume, including stays —nay, necessarily involving stays—attached to a marble figure, not yielding to receive stays, would have a grotesque effect; though this would not prove that beauty in ancient times missed stays. Nigger costume would look equally ridiculous. It is begging the question to find here an argument for the corset.

2. I think the good health claimed for corset-wearers, must equally mean "good, in those respects in which it is not bad or ruined"; for waists in such condition that contraction to 7 or 8 inches is found essential to comfort, may be very fairly compared to the disabled feet of the Chinese ladies.

3. The "multitude of people" prove just what I said, by their *consensus* in asserting that they find themselves better in stays. This shows that contracting waist does weaken the stomach; and if it does, it must. ("Bunch" is not in question; no one asserts that a mile-stone has a fine feminine figure; yet a woman may as reasonably shape herself after a milestone as after an hour-glass.)

4. A truss is necessary for persons with a particular ailment. But it seems from the arguments of the corset wearers themselves that stays are necessary for divers ailments—as the tendency to *embonpoint*, indigestion, stooping, and so forth. The truss alone can remedy the first ailment; exercise and attention to diet will remedy the others; only it is easier to strap on a corset. I shall presently, by the way, give much more evidence from experience than "An Observer's" case can bear without breaking down; and amongst this I shall note some which indicates a closer connection between the truss and the corset than he seems to think of; for overwhelming medical testimony shows that those who lace tightly are exposed to serious risk of rupture.

XUM

5. If the "Grecian bend" was caused as our correspondent says, and was not, as others say, a silly affectation in imitation of the enforced lame gait of a certain princess, it would only prove my case; for it is certain the persons who showed this weakness had been corset wearers. I shall give such evidence as to the strength and upright carriage women can acquire who only use corsets after full womanhood has been reached, as to prove the utter impossibility of such weakness arising in the case of young women who had not been figure-trained from early girlhood by mothers either unknowing or foolish. (Exercise will not *always* succeed, no doubt: for all are not able-bodied; nor with corset-pinched mothers is it to be wondered at.)

6. Of the necessity of the corset in the case of many women, and men, too, I have never had any doubt, any more than I have about the necessity of crutches in many unfortunate instances.

THE GREAT COMET.

THE following is taken from a description of the comet communicated by M. Cruls to the Paris Academy of Sciences. It relates to the comet as seen after perihileon passage.

"On September 25, at four in the morning, the sky was clear near the horizon, and enabled us to assist at a spectacle whose beauty surpassed description. A part only of the tail rose at this moment above the horizon. Its

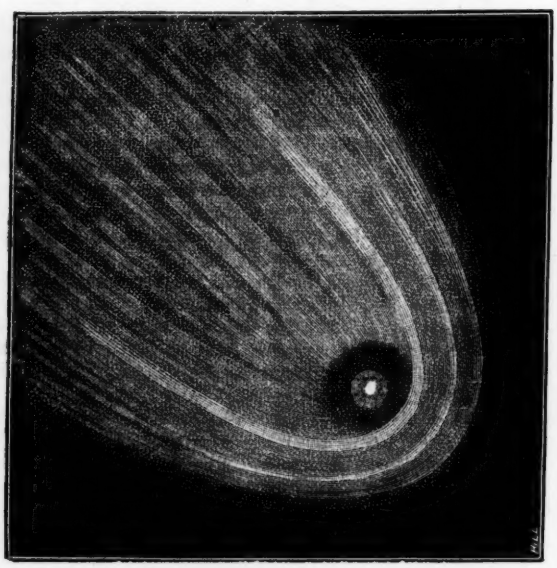

Fig. 1.

aspect was truly impressive, for it appeared rather like a column of fire than a beam of light. The tail was nearly perpendicular to the horizon, and of a well-pronounced, conical form, measuring about 1° 30′ at its widest part, and 40′ at the base. It is impossible to give an idea of the gorgeous effect (*l'effet grandiose*) produced by this column of fire, to which the lower strata of the air gave a yellow-ochreish tint—a tint strongly reflected in the waters of the mouth of the Rio. If I dwell on the impression felt at the sight of this phenomenon, it is because, to an attentive observer, there was more in the spectacle than a mere subject of barren wonder. The telescopic examination of the tail, as the parts nearest the nucleus became visible, showed demonstrably, and without any possibility of optical illusion, the appearance of a *stream* of light, extremely bright, in which threads brighter than the adjacent parts could be distinguished, and the effect suggested strongly the idea that one would form of a jet of molten metal.

"When the nucleus was at some height above the horizon, it shone with great brilliancy, having a diameter of about 1′ of arc. A streak of light curved round the nucleus, and on either side, behind, the two branches, enlarging, lost themselves in each other, forming the beginning of the tail, which in its prolongation preserved a noteworthy intensity of light for a distance of about ten or twelve degrees. Following the axial line of the tail, one could recognise a darker track, and just behind the nucleus

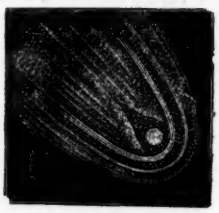

Fig. 2.

there was a space almost entirely without light and of an elongated form, growing narrower from the nucleus to a distance of about 30′ of arc.* This peculiarity, combined with the general characteristics of the comet's aspect near the nucleus, suggested involuntarily the idea of an eddy such as is formed down stream behind the buttress of a bridge in the middle of a strongly-flowing river, or more precisely recalled the vacuum left in the track of a projectile traversing the air with sufficient velocity.

"I must also note here: First, the marked curvature of the tail, the convexity of which was turned southwards; and secondly, a very marked difference between the distinctness of the edges, the convex edge being tolerably sharp and well-defined, while the concave edge was softened off and indistinct. Examined with a low magnifying power (from 8 to 10 times) it appeared rather as if it were of a vaporous nature.

"Around the nucleus a coma (*chevelure*) could be seen, which was about 20′ in width, on a line through the nucleus at right angles to the tail's length. This coma was of faint luminosity, though distinctly visible in the field of view of the great equatorial armed with a power of 60.

"As regards its length and luminosity, the tail consisted of a very luminous beam, growing obviously larger with increase of distance from the nucleus to a distance of about 12°, and ending, so to speak, abruptly. A portion of the tail extended further, but under an entirely different aspect. On the convex side, where the sharpest edge was seen, a luminous beam exceedingly faint, having a width equal to about 2·5ths the breadth of the tail at its broadest end, extended to a distance of about 15°, giving a total length to the tail of nearly 30°. In reality, then, and this was one of the most remarkable and striking features, the tail formed a very luminous and slightly-curved beam enlarging for 12°, and ended there sharply, presenting the appearance of rupture, and then extended to a distance of 15°, this prolongation having a much smaller width,

* We give the picture of the head (Fig. 1) as it appears in *Les Mondes*, but it does not at all agree with M. Cruls' description. Possibly his drawing was indistinct. The appearance he describes is well known, and has been observed in many comets (Fig. 2).

and a luminosity incomparably fainter than had the other portion of the tail.

"May I here be permitted an indiscretion, pardonable, I hope, since it is committed in the interests of science, by quoting the opinion of his Imperial Majesty, Don Pedro II." (good gracious, what a daring thing to do!) "who has been able to contemplate the comet since Sept. 25, and who, comparing it with that of 1843, has condescended to express himself in the following terms?—'I observed, well, the comet of 1843. It was not so remarkable in the brightness of the nucleus and the tail, but it was very much longer. I saw it with the naked eye quite close to the sun on Feb. 28, a phenomenon which has also characterised the present comet; several days after, I examined it at sunset, during several hours; the tail nearly reached the zenith, the nucleus being but little raised above the horizon.'"

(*To be continued.*)

DESTRUCTION OF RARE ANIMALS AND PLANTS.

By Richmond Leigh, M.R.C.S.

THE fauna and flora of the British Islands is slowly, yet surely, diminishing in number of individual species. The increase of population, with its concomitant houses, manufactories, and other buildings, is the great cause of this diminution. But another and preventable cause is an important factor in the change. This is the destruction of the rarer animals and plants by naturalists and sportsmen. The rare bird which might revisit, and breed regularly in, our latitude, is ruthlessly shot for the poor advantage of being closely examined, and perhaps added to some private collection; and, for a similar reason, the uncommon plant is pulled up by the root, and prevented from adding beauty and variety to our native flora. It is human nature to do this without thinking of the injury done to future observers; and for the sake of obtaining the admiration of the few, which, unfortunately, is at the expense of the many.

But little consideration will be required to see that more harm than good is done to the study of natural history by this course. The loss of any species is practically irreparable, and our somewhat scanty fauna and flora should rather be carefully nursed than carelessly destroyed. The student should be taught to look for his material in the living book of Nature, not in the dry bones only of herbariums* and museums.

Travelling recently in Scandinavia, I was struck with the greater tenderness—or oblivion (?)—with which birds were treated, for even in the large cities, the sparrows were so tame that they would hardly rise from under your very feet, and magpies, in country villages, were as familiar as pigeons here. It may be unreasonable to expect the youth of this country to show the want of mischievousness implied in the preceding—though education in natural history might even do this—but the full-fledged naturalist might display an equivalent love of Nature, and seek her preservation and protection.

Then might the true naturalist and lover of Nature be gladdened by the sight of rare (at present) and beautiful forms of life much more frequently than now, and thus be able to learn more of their habits, growth, and life history.

The only justifiable cause for the killing of rare animals, or the removal of rare plants, should be that they might be added to a standard collection, as the British Museum, and to some few other similar institutions in the large centres of population; but beyond this no destruction of rare species should be encouraged, but, if possible, entirely stopped.

It is indeed desirable that no animals or plants be destroyed except for purposes of food, or when their numbers threaten injury to other food-producing plants or animals, or to men.

* In preference to herbaria.

THE DOVE FLOWER.

THE dove flower, or *Peristeria alata*, is very rare with us, as its home is Central America. The leaves of the flower are white and spotted, and give the flower the

appearance of a white bird with extended wings. The inhabitants of Central America adore this flower, believing that it represents the Holy Ghost, on account of the

resemblance to a white dove—the symbol of the Holy Ghost. For that reason the flower is also known in that country as "Flora el Spirito Santo." The flower represented in the cut was in bloom in the garden of Mr. L. M. Stone, 482, Franklin-avenue, Brooklyn, a short time ago.—*Scientific American.*

FORESTS AND CLIMATE.

A PAPER has been prepared by Dr. Schomburgk, the Director of the Botanical Gardens at Adelaide, on the influence of forests on climate. The object of the author is to prove that the destruction of forests usually has the effect of reducing the rainfall, while, on the contrary, the planting of trees broadcast over a country is one of the best methods which can be adopted for ameliorating its climate and increasing the annual fall of rain. It cannot, indeed, be proved that the climate of South Australia is altering for the worse in this respect. In fact, a comparison of the meteorological records will show that the annual average rainfall for the colony during the past ten years has been 21·1 in., as compared with 20·1 in. for the previous ten years. The fact is that in the agricultural districts of the colony, and especially in those which were not originally timbered, the bringing of the land into cultivation has had the effect of slightly favouring the fall of rain. Ploughed land attracts moisture to a much greater degree than the unbroken soil. In considering the effect which the removal of forests *per se* has in altering the climate in South Australia, the only direct test that could be taken from the records issued by the Government astronomer is the experience of the neighbourhood of Adelaide. If the time is divided which has elapsed since 1839—the year in which observations were commenced—into two periods, there is found for the first an average rainfall of 22·8 in., and for the second one of 21·7 in. It will thus be seen that, on the whole, the rainfall at Adelaide is diminishing, though very slightly, and perhaps the diminution in the amount of timber may have something to do with the change. Dr. Schomburgk, in searching for illustrations of the effect of trees on climate, goes further afield, and brings forward some striking instances, in which it is evident that loss of forests means loss of rainfall, and *vice versâ*. He recalls how the Russians, by burning down some of the Transcaucasian forests at the time of the struggle with the Circassians, converted the country from a fertile land into a desert, simply through the cutting off of the supply of rain. Similar instances of rain having deserted a country denuded of forests have occurred in the Mauritius, in Jamaica, the Azores, and, it may also be added, to a still more remarkable extent in several of the smaller West India islands. No sooner had the forests of these places been destroyed than the springs and rivulets ceased to flow, the rainfall became irregular, and even the deposition of dew was almost entirely checked. On the other hand, it is generally accepted as a fact, that Mehemet Ali increased the fertility of Egypt enormously by the planting of trees. He alone planted some 20,000,000 on the Delta; his successors followed up the work, and it is a noteworthy circumstance that the rainfall rose from 6 in. to 40 in. Planting has also, it would seem, produced remarkable effects in France and Algiers. Extensive regions have been planted with gum and other trees, which, for the most part, grew to about 30 ft. or 40 ft. in height, and it is noticed that the quantities of rain and dew which now fall on the adjacent land are double what they formerly were. —*Architect.*

LUMINOUS PAINT.

By W. H. Hyatt.

(*Lecturer on Luminous Paint—Crystal Palace.*)

AMONGST the many valuable applications of science to the wants of mankind, few will exceed in interest the composition now known as "Balmain's Luminous Paint." The subject of luminosity has engrossed the minds of many scientific men since Casciorolo, of Bologna, in 1602, accidentally discovered that by roasting heavy spar in a furnace, a substance was obtained which had the property of giving off light, after having been previously exposed to daylight. This substance is what is now known as sulphide of barium. Since that time, it has been discovered that the sulphides of calcium and strontium, besides many other compounds, possess this remarkable property, which has been termed phosphorescence, or by many, "Fluorescence," as conveying a separate meaning, though the two are nearly, if not quite, identical.

The late Mr. Balmain studied this subject for forty years. At the end of that time, he patented, and brought out as a paint, a preparation containing rather more oxygen than a sulphide, though not sufficient to form a sulphate. When an article painted with this luminous paint is passed before the spectrum, no fluorescence appears till it reaches the green, the violet, and the ultra-violet, or actinic rays. The ultra-violet rays being too short to affect the eye, these it absorbs, and gives them off again in longer waves, which at once become visible, and continue so for many hours. On the contrary, a strong red or yellow ray will take away the light from an already luminous surface. To speak in simple language, any surface painted with luminous paint and exposed to daylight in the daytime, will shine the whole night through, even the longest winter nights. When a bell is struck, literally the whole of the bell is in motion, and gives off waves or vibrations of sound; in exactly a similar manner any wave of light, natural or artificial, falling across the surface of this luminous paint, causes the whole of the molecules of the paint to vibrate, and give off waves or vibrations of light, which continue from twelve to fifteen hours, and in exceptional cases, twenty hours. Life-buoys, mooring-buoys, channel-buoys, &c., painted with luminous paint, are distinctly visible, where a white-painted buoy is totally obscured. The paint may be used for a thousand different purposes, anywhere where white paint is generally employed, under the erroneous impression that white paint at night is visible, whereas it is perfectly invisible. Heat will increase the luminosity, and intense cold, as in the Arctic regions, will entirely destroy it, though the luminosity returns when restored to an ordinary temperature. The light given off will not affect the most sensitive photographic plates; added to this, a painted board may be carried, as a lantern, into the most dangerous places, as in powder magazines, without fear of explosion. The rapidity with which this paint will store itself with light is truly marvellous. Ten seconds exposure to diffused daylight will cause it to shine for as many hours, though the more daylight it has, the better the subsequent effect. The light for the first hour after being exposed is violet, owing to the more rapid vibrations being given off; after that it is white, till it ceases entirely. Nothing but exposure to light is again required to cause it to again emit light. This action lasts for months or years, according to the amount of exposure to weather that the paint receives. To speak roughly, it is rather more durable than ordinary paint, and continues to act till the paint is either coated with dirt or worn off, as the action is purely mechanical. The popularity of this

paint is vastly on the increase, and its future will doubtless be very great. Not only is it used by Government, as during this last Egyptian war, but also by several railway companies, as an experiment for lighting their carriages through tunnels, and by many private individuals, for buoying channels at night, and a variety of similar purposes. An example of this is the painting of the end of Folkestone Pier, to act as a beacon at sea.

When we appreciate the number of lives that may annually be saved by this and other practical applications of scientific facts, the truth is most forcibly brought home to us that "knowledge is power."

THE AURORÆ.

IN justice to these interesting phenomena, it is only right to remark that the one of the 17th was only a part of a series extending from the 13th to the 24th, at least, and that during this period sun-spot and magnetic disturbances were correspondingly active.

The sun-spot you have figured (p. 431), as sketched at 11 a.m., November 20, had much changed in detail by 10 a.m. the next day, and it would fill pages to notice the almost wonderful needle variations and solar storms which have accompanied the recent auroral displays. With reference to the still enigmatical spectrum of the aurora, will you permit me to record that the moving patch of light seen at 6.10 on the 17th was really an auroral cloud or beam, and not a meteor, as described in the *Times*. With the spectroscope I found only the auroral citron line, and none other. [Correspondents who are calculating orbit of supposed meteor, please note.—R. P.]

The moonlight gave no opportunity to examine the full spectrum; but I should like to ask your spectroscopic readers (as we are now at an auroral epoch) to direct their particular attention to the fainter lines towards the violet (the red and citron are already closely positioned) of this spectrum. It must not, however, be expected to measure these except in a dark field, and a companion spectrum or illuminated scale would render them invisible. A single illuminated line or point, a dark diaphragm traversing the field, or a photographed transparent micrometer illuminated by the spectrum itself, will alone give hope of success. Touching the *lumière cendrée* on the moon, described by one of your correspondents, as seen during the aurora, I also remarked this, but found it pink in tint, instead of green.

T. Rand Capron.

THE TRYPOGRAPH.

EVERY ONE who has used stencil plates must have often thought how convenient it would be to extend the system. But even in single letters the method fails; you cannot stencil an O, or a P, or an R, a D, or a B; at least, you have to complete the letter afterwards. To stencil ordinary writing, and still more, a drawing, seems hopeless. Yet this is what the "Trypograph, or Hole-Writer" does. The idea is a good one, and simple in the extreme,—when *shown:* (like Columbus's trick with that weary egg which we all wish had never been laid). You write or draw with a metal pencil on stencil-paper—that is, paper specially prepared to suit the work—placed on a metal plate the surface of which is like that of a finely cross-grained file. As the pencil presses the paper against this surface, multitudes of minute holes are made along the pencil's track. Then the stencil-paper is ready for use any number of times, precisely as a stencil-plate is used. A broad, flat scraper, dipped in a certain kind of ink, is passed over the paper, and the ink, passing through the holes, duly marks a sheet of ordinary paper underneath. Any number of copies may be taken in this way, each requiring only a single stroke of the scraper—at least, after a little practice has been obtained. A most convenient instrument this, where writing or drawing has to be many times copied; cheap, too, and easily used, success being readily attained at a first or second trial, and thereafter systematically.

The New York Edison Company state that they are now lighting from their central station in Pearl-street, 191 houses, with 4,288 lamps, of which over 2,700 burn almost continuously. It is expected that an additional 1,000 lamps will be in use before the end of the year. The fire insurance companies make no difficulty about granting licences.

The Ferranti Dynamo Machine.—This machine, which is a combination of the invention of Sir W. Thomson and M. Ferranti, has for some weeks been causing a considerable commotion in the electrical and stock-broking worlds. It is at length made public, and bids fair to far outstrip anything yet produced for incandescent lighting. All the details are not yet available, but it is our purpose to supply them when the proprietors consider their patents secure, which they tell us will be about four or five weeks hence.

The Advantage of Knowing how to Swim.—The Sydney *Morning Herald* of August 25 says: "We learn from a correspondent that, a short time ago, Mrs. G. A. D. McArthur Campbell, formerly a resident of Coonamble, distinguished herself by a deed of admirable bravery. Mrs. Campbell was a passenger in a steamer from Hong Kong to one of the northern ports of Queensland, and one day a little boy about four years of age, to whom the lady was much attached, fell overboard, the accident occurring through a sudden lurch of the vessel. With the exception of Mrs. Campbell and the man at the wheel, all the passengers and crew were at dinner. Without waiting for a life-buoy, or divesting herself of any clothing, and simply saying to the man at the wheel, "Don't tell the child's mother," Mrs. Campbell plunged into the water, swam to the boy, and held him up till both were rescued, the steamer having been promptly stopped and a boat lowered. Neither the lady nor the boy was much the worse for the immersion."

A Whale Snaps a Log-Line.—A correspondent sends the following:—"On the writer's last voyage from Baltimore to Rio de Janeiro, *viâ* Pernambuco, his attention was called to a large whale leisurely floating on the water near the stern of the vessel. All at once he seemed possessed with a spirit of frolic, diving and coming to the surface with the most playful motions. As his huge head descended, he would slowly expose his tail, until for several seconds it remained erect on the water. I chanced to have one of Messrs. John Bliss & Co.'s logs in use, the line and rotator towing astern. Never in thirty years' of sea experience did I see or hear of a whale biting anything, but, to my surprise, he took the rotator of that log in his mouth. Immediately my mate and a passenger, in order to save the indicator, seized the line, which quickly snapped in their hands, and was drawn off by the whale, who wound it round and round his head until he appeared completely bewildered. This incident occurred in lat. 10° 5′ south, long. 38° 11′ west. I would advise all ship masters to haul in their line and rotator when whales are about, or they may lose them as did your obedient servant, John T. Holt, master of ship *David Stewart*."

XUM

Reviews.

POKER.*

ALMOST interesting book on a fascinating (we are told), but most objectionable game. Our author tells us that what is wanted for success at Poker is—first, good luck; secondly, good cards; thirdly, good temper; and fourthly, good cheek. But good cheek, above and before all things else, is essential to success. We should recommend for the four things needful—A lying face, a false tongue, the impudence of a bank thief, and the nerve of a practised pick-pocket. We can understand the charm of the game; we can even imagine honest men enjoying it as a trial of skill; it makes a most enjoyable parlour game, with ivory for stakes; but how any man can play Poker as it is played (as "One of its Victims" truly describes), and yet retain a particle of respect for himself, we really are puzzled to imagine. When a Poker-player assumes the aspect of an honest man, he simply "bluffs" the world; if he backed his honesty, the world might "see him" safely, "see many better," see few worse; and if the world were to "call," it would be seen what a "foul hand" he has; not a "flush" of shame for love or money: (the clergy would tell him that as a "sequence" he would have a "blaze," but that's neither here—certainly not here—nor there).

Yet the book is most amusing. It shows well, too, the ultimate fate of every ardent Pokerite. The story of the "æsthete" who won "too too" easily, and then remembered him how "he used to indulge in this little recreation at Oxford . . . come, therefore, and take a snifter with me," is as amusing as anything of Artemus Ward's or Mark Twain's. The game is fully explained, as are all its objectionable offshoots. The chances are given, for the most part, correctly; but the reasoning quoted on pp. 81-83 from Mr. Blackbridge's "Complete Poker Player" is quite incorrect; and his inference that you may safely bet greater odds than the theoretical 5 to 1 against a "size" being cast after one or more already cast, would be very unsafe to follow in practice. If a die were to be cast a great number of times, and after every time "size" had been thrown (say) six times in succession, odds of 10 to 1 were wagered against a seventh "size," there would in good time be a woeful balance against the layer of the odds.

THE PARALLEL NEW TESTAMENT.†

WHATEVER opinion may be formed as to the literary value of the Revised New Testament, there can be no doubt whatever of its value to those who wish to know in what respects the version of 1611 was incorrect, according to the opinion of the ablest biblical scholars. But every one who has looked over the revised version for this purpose must have noticed the difficulty of making the comparison, and must have felt the wish to have the two versions in parallel columns. The Parallel New Testament meets this want. It is likely soon to be in the hands of all who have seen the Revised New Testament. It shows at once where the two versions differ, and where both differ from other readings of which some scholars approve. For our own part, we never found patience to compare the two versions closely till the Parallel New Testament made the task at once easy and pleasant.

But what an opportunity the Revisers have lost! Are we never to have the New Testament in the English of our day? Are the priesthood afraid to translate the Gospels into such English as the men of our time speak? Faith must surely be getting feeble if such a fear is well founded. It would be a useful exercise for some of our clergymen, after learning to preach as they would speak, and not as if they were half-inclined to sing (moaningly, like the distant wind), to try the effect of Bible passages in modern English. Is there anything irreligious, for instance, in this? "So Jesus said to them, I tell you truly that it was not Moses who gave you bread from heaven; the true bread from heaven is given you by my Father." Is there anything especially suggestive of devotion in the "Verily, verily," the "Unto you," the "Giveth," and so forth? If so, *such* devotion must be a plant of very shallow growth.

REPORTS from Kirkwall, dated Dec. 11, speak of a severe thunderstorm which passed over the Orkneys on the previous night, severely wounding five people and killing four cattle. The storm came on shortly before six o'clock, and continued for some time. As Mr. William Hepburn, wife, and family were sitting at the fire, a flash came down the chimney, and struck the whole five. Mrs. Hepburn was struck behind the ear, her ear being laid open on her cheek; her husband was severely struck from the abdomen down. Miss Hepburn, her brother, who was married, and his little boy, were also struck. Some of them had their clothes burnt. Grave fears are entertained for the recovery of the old people.

CONTINUOUS ELECTRIC LIGHTING.—During the recent extraordinary fog, the Edison Electric Light Company, recognising the necessity for distributing the light to their customers without intermission, maintained their dynamos at Holborn-viaduct in action for a continuous period of sixty-four hours without stopping. Starting at three o'clock on Saturday afternoon, Dec. 9, the dynamos ran without ceasing during Saturday, Sunday, Monday, and Monday night, stopping at eight o'clock on Tuesday morning, Dec. 12. We do not know of any previous continuous, nor, in fact, any similar running to this. The current was supplied from two large dynamos, which are used alternately, the change being made without any perceptible interruption in the lighting.

ITALIAN ASBESTOS.—The mining for asbestos in Italy is at present limited to the provinces of Sondrio and Turin. The asbestos in the former occurs in regular strata, varying in thickness from three to four inches, although in some cases it has been found twenty inches thick. The enclosing rocks are chloritic and telcose schists of a greenish colour, and the asbestos is found chiefly in fibrous masses of a yellowish-white colour. In some cases the fibres are long and firm, resembling a skein of thread of a yard or more in length. It has also been found that asbestos abounds in the fissures of serpentine rocks, and it is often accompanied by other minerals, among which garnites of a green colour have been found in minute crystals, to which miners have given the name of "Semenize dell' Amiento," meaning seeds of asbestos. The excavations are carried on in forty different places, and as a rule the enclosing rock is quarried by blasting. In some cases, where too much material would have to be removed, the workings are driven forward in the asbestos-yielding stratum, leaving pillars here and there to support the roofs of the workings.

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* "Poker; and How to Play it." By One of its Victims. (Griffith & Farran, London.)

† "The Parallel New Testament (the authorised and revised versions in parallel columns)." Printed for the Universities of Oxford and Cambridge. (Published by Henry Froude, Oxford, and C. J. Clay, M.A., & Sons, Cambridge.)

Letters to the Editor.

Only a small proportion of Letters received can possibly be inserted. Correspondents must not be offended, therefore, should their letters not appear.

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No communications are answered by post, even though stamped and directed envelope be enclosed.

"Let Knowledge grow from more to more."—Alfred Tennyson.

THE TRANSIT OF VENUS—SATURN'S RING—BRAIN TROUBLES.

[661]—If I am not transgressing the "unwritten law" of Knowledge by treating of three separate subjects in one letter, I should like to say:—

1. That I observed the Transit of Venus on December 6, from 2h. 27m. 21s. p.m., Maresfield Mean Time, until about half-an-hour before sunset. I failed, of course, to see the first contacts, either external or internal, as the latter was calculated to take place at 2h. 21m. 41s. at my observatory, and it was only at the time previously specified that the sleet ceased and the clouds broke sufficiently for the sun to be glimpsed at all. What struck me most in the view of the phenomenon which I had, was the apparently large size of the planet, which resembled a jet black five-shilling piece on the solar disc—the "milling" on the edge, by-the-by, being fairly represented by the rippling due to our own atmosphere. Venus was, as far as I could see, absolutely circular, no sign of ellipticity being visible in her disc. Moreover, with the utmost attention, I could detect no trace of an atmosphere around the planet the solar photosphere appearing homogeneous up to his very limb. The interposition of a plantation compelled me, after 3 o'clock, to exchange my 4·2-inch equatorial for a 3-inch telescope, and with this my wife noted a reddish shading round the circular outline of Venus; as, in fact, I fancied I did myself. I am a little afraid, though, that want of achromatism may have had something to do with this, as the effect was invisible in the larger (and absolutely perfect) instrument. It was very odd to notice that refraction converted the circular outline of Venus into a markedly elongated ellipse as the sun approached the horizon; an instructive illustration of its action at small altitudes, inasmuch as the diameter of Venus was only 62″·8, and her lower limb must have been (apparently) considerably more raised than her upper one for her to have assumed the figure she did.

2. While thanking Mr. Herbert Rix for the really valuable information contained in letter 656 (p. 471), I must ask him to forgive me for pointing out that the "mistaken assumption" to which he refers was not really mine, but that of the late Mr. Breen ("Planetary Worlds," p. 217). I may, perhaps, note here, too, that Chambers (following Hind) calls the place of residence of the Brothers Ball, "Minehead, but curiously locates it in Somersetshire.

3. The description of an odd brain trouble which I experienced some two or three years ago may not be without interest as a supplement to letter 657. I had been hard at work taking out some hundreds of logarithms for the formation of a table of constants for the reduction of my Transit observations; and, my work over, I found myself continually making the extraordinary mistake of transposing the last two figures of any series I was writing down in a hurry. For example, for 94,623, I would write 94,632; for £8. 6s. 3d., £8. 3s. 6d.; for 1879, 1897; and so on. A short abstinence from calculations, though, set all this right again. [This curious mistake is very common among bank clerks, inasmuch that when the balance for the day is wrong by such an amount as 2s. 9d., the more ingenious would set to work to ascertain by what transposition of the kind the error may have been produced, often thus getting the balance right. It is to be noted, however (though this has no bearing on Captain Noble's remark), that such a difference may be given in several ways. Thus 2s. 9d. is the difference between 4s. 1d. and 1s. 4d.; between 5s. 2d. and 2s. 5d.; 6s. 3d. and 3s. 6d.; and so forth. Note further, that in every such case, the sum of the numbers of shillings and pence is always eleven. This may be easily shown. For, let a sum of a shillings b pence be written by mistake as b shillings a pence. Suppose a greater than b, then the error is $(a-b)$ shillings $+(b-a)$ pence $=(a-b-1)$ shillings $+(12-a+b)$ pence (for $b-a$ being negative, we must, to give as usual a positive number of pence, add 12); so that the sum of the numbers of shillings and pence $=(a-b-1)+(12-a+b)=11$.—R. P.]

William Noble.

BRILLIANT METEOR.

[662]—On the evening of Wednesday, the 29th ult., about 11.30, a very brilliant meteor was seen in the neighbourhood of Auchterarder, N.B. It went in a northerly direction, and came very low down before it went out; it lighted up the whole district so clearly that the minutest objects could be seen. During its flight it dropped fire something like a piece of iron when taken out of the furnace at a white welding heat; it continued to drop fire in this way until it went out, and then, in about a minute or so afterwards, a sound was heard like distant thunder, which lasted for a short time; the sky at the time was clear and the stars shining brightly. The meteor was a most brilliant one; the sight of the balls of fire constantly dropping from it was very grand.

Would the sound like thunder be the meteor exploding, or would it be a series of explosions which caused the fire to fall from it and make the sound? R. M.

[More probably, I think, the effect of the atmospheric disturbance.—R. A. P.]

A BOTTLE TRICK.

[663]—The following interesting experiment might be tried by some of your young friends when at the sea-coast. Take a clear quart bottle, and attach it at the neck, about two feet from the end of a deep-sea fishing-line, which must not be shorter than thirty fathoms. The lead sinker should be sufficient to submerge the bottle while empty. Let the bottle be well corked, the cork being of the same thickness throughout, and marked distinctly at the upper end. Sink it thus empty from a boat, in about thirty fathoms of water, and let it remain at the bottom ten minutes or more. When hauled up, the bottle will be found nearly full of water, and the cork reversed. R. Montgomerie.

RAINBAND SPECTROSCOPY.

[664]—As you invited the readers of Knowledge to send you their experience of the rainband spectroscope, I am now sending you mine, in case you think it worth insertion. I may remark, in passing, that I have pleasure in confirming what Mr. Cory has written in Knowledge, Nov. 3, 1882.

1. When a band appears in the "red," small rain may be expected, the intensity and duration of which will depend on the strength and number of the bands.

2. If the sun-lines in the "green," instead of appearing clear and distinct, appear thick and muddy, heavy rain (like thunder rain) will follow, and this whether there is any rainband in the "red" or not.

3. If on moving the spectroscope slightly to the left the "blue" appears very light and the dark line down is clearly seen, then wind may be expected. I may say that this never fails.

4. One day, on looking through, I noticed, on moving the spectroscope slightly to the left as above, a peculiar appearance about the green and blue. The green, instead of giving way to the blue, seemed to fight with it and *pass over* it. Later in the day a thunderstorm followed. Twice since I have noticed this sign and predicted a thunderstorm, which occurred each time.

I have had my spectroscope since the beginning of June, and am indebted to Mr. Rand Capron's pamphlet, "A Plea for the Rainband," for learning how to use it; and I have, as a rule, adopted his plan of looking with the red colour on the left.

Liverpool, *Nov.* 10. J. A. Bramley-Moore.

THE HAMILTONIAN SYSTEM.

[665]—For the information of your readers, may we say that the Hamiltonian system has not fallen out of print. It has been published by us at the subjoined address for the last ten years, has been kept in stock for many years, and supplied by Messrs. Simpkin, Marshall, & Co., of Stationers' Hall-court, and Messrs. Hamilton & Co, of Paternoster-now, the two largest retail publishers of the trade, and can be had of any of the school-book houses in London.

C. F. Hodgson.

Gough-square, Fleet-street, E.C., Dec. 18.

XUM

A LUMINOUS SEA.

[666]—With respect to one or two articles in your columns respecting the above, I beg to give a slight account, viz., during a run across from Bombay towards the Red Sea—making Socotra—I paid special attention to its intense phosphorescence; in one place we ran a distance of 100′ with a splendid white sea between long. 60½° and 56¾°, and again 90′ between long 56° and 52°, latitude varying from 16° to 15° north. The deceased W. Symington, F.R.G.S., commander of S.S. *Hankow*, whose command I had the pleasure to be under, gave it as his opinion that the phosphorescence extended several feet below the surface, which is my opinion, but to what extent more scientific research was requisite. I should like some of our scientific men to give an explanation in your columns of the supposed causes and depths of luminous seas. S. J. H. B.

[667]—From my diary of what I observed in the Mediterranean:—

Oct. 29. Off Cabo de Gata. The sea very luminous; the ripple at the bow of the steamer full of shining bodies apparently an inch and upwards in diameter. These became visible only when the cutwater threw up the foam. "Jellyfish" were shining brightly, apparently some feet below the surface. They became extremely bright when approached by the vessel. Two large fish (porpoises?) skimmed athwart the course of the ship, showing parallel furrows of coloured light, which ceased as they sank beneath the vessel, and reappeared as they rose to the surface again on the other side. Their wake continued to sparkle for a couple of seconds after they had passed. Another porpoise swimming at the cutwater looked from above as if filled with pale opal light—without flashes, except when his fins or tail cut the surface.

Nov. 1. Alicante. As the vessel lay in harbour, the still water in the deep shadows looked almost black. Shoals of small fish were playing on the surface, showing themselves by ripples and sparks of light. The oars dripped golden spray when lifted at each stroke, and the light produced by the ripple against the boat's side and the fingers of a hand trailed through the water was sufficient to enable one to distinguish small objects, but not to read print.

A handful of gravel thrown into the harbour produced a pretty sparkle, and a flat stone skimmed along the surface raised a bright flash at each skip. The water was dark except when disturbed, but jellyfish could be distinguished shining, apparently at some depth.

Both nights were warm and very still. Barometer about 30·1 in.

M. S.

Answers to Correspondents.

This section is limited to one column as the maximum. Only a small proportion of the letters received can, therefore, be answered here. Many not answered may nevertheless be noted and acted upon. Letters raising religious, political, or personal questions, asking for text-book information, proposing class-room problems for solution, and so forth, pass at once to a receptacle specially provided for them. A stern and inflexible censor has been specially appointed to stand between a too-yielding Editor and those who thus unreasonably claim his attention and space which should be otherwise occupied. NO LETTERS ANSWERED THROUGH THE POST.

Iron Pyrites.—In reply to "D. and M.," p. 422, this is of some value for the sulphur it contains; its value as an iron ore is spoiled by the sulphur, the process of separation being too costly; it has a market value. (C. G. P.)—A. R. Your query should have been answered before, but there has been some difficulty in obtaining precise information. Alum cake is a specially-prepared body. It is manufactured from china clay, free from iron. This substance is a hydrous silicate of alumina, produced by the decomposition of granite rocks. The clay is calcined in a furnace, and then treated with sufficient sulphuric acid to combine with the alumina present, and form sulphate of alumina according to the equation:— $Al_2O_3(SiO_2)_2, 2H_2O + 3H_2SO_4 = Al_2O_3(SO_3)_3 + 2SiO_2 + 5H_2O$. The reaction which takes place is a very violent one, necessitating the dilution of the acid with water. The mixture boils violently, gradually becomes thicker, and finally a solid porous mass, which is perfectly dry. The water it contains combines with the sulphate of alumina. The whole of the silica of the clay is still present, but is in an impalpable form.—Certo. Your query with reference to experiments proving "Avogadro's Law," deals with a subject of very general interest. We will ask Mr. Jago to supply for our chemical column a paper on the subject.—Aqua. Soft water would not be hardened by passing through either a pump or leaden pipe. Hardness is due to the presence of salts of lime or magnesia. The carbonates of these bases are held in solution by carbon dioxide gas, if present in the water. The sulphates of lime and magnesia are themselves soluble. As carbon dioxide is expelled from water by boiling, the carbonates are then deposited and the water thereby softened. This treatment does not affect sulphates. Try whether the water in question is softened by boiling; if so, the hardness is only "temporary" and can be removed by the addition of a proper quantity of slacked lime, stirring the whole up, and then allowing it to settle. It would be well to get the hardness determined by a chemist, who would also inform you as to the proper quantity of lime to add to, say, ten or a hundred gallons of water. This is an economical and simple process; it would not, however, effect the removal of hardness due to sulphates.—Harroviensis. Your best plan will be to go to some gentleman professionally engaged in teaching chemistry, and who has had experience of technical analysis. Mr. Jago, of the Science School, Brighton, might be able to help you.

ELECTRICAL.

F. W. Halfpenny. See article on "Griscom Motor" in Knowledge, No. 54. How many machines do you require to work? Are they all in one room, or distributed over a building?—Cranleigh. 1. See answer to C. J. B., &c. 2. No.—James Grundy. 1. Mr. B. S. can doubtless supply what you require. Write and ask him. 2. About two-thirds of a pound to each plate. 3. I wrote from my office for a price-list from which I quoted, but which apparently gives wholesale prices. 4. Glad you appreciate it; the dynamo will be described in a week or two.—Fred. W. Foster. I take it that by far the greater portion of the readers of Knowledge are neither dunces nor wiseacres, but people of fair intelligence, who, having a little knowledge, desire more, and that, having been once informed of the meaning of a particular term, do not wish every reference to that term to be accompanied by an elaborate definition. Granted that the article in question contained technicalities, there were none which had not been previously explained. Certain expressions are furthermore imperative, as, for instance, electro-motive force. Were I, instead of this term, to substitute "tension" or "intensity," I imagine that we should receive sufficient letters condemning the crime to fill Knowledge for a month. Let me assure you that technicalities are avoided as much as possible, their use being confined to those occasions when the adoption of any other term would lead to misapprehensions or such-like difficulties.—C. J. B., Hugh McMaster, F. Clapham, Split Ring, W. H. Druce, and P. C. Agent, Mr. Heap, 2, Scott's-yard, Bush-lane, Cannon-street, E.C. £3. 1s.; with battery, £6. 5s.—C. S. B. Presume you have some foundation to work upon. Surely you have a public library in Leeds, and should, therefore, be able to choose for yourself. To gain a "thorough" knowledge of electricity alone, ignoring altogether the other subjects you enumerate, you would require more books than have yet been published. Our rules forbid my mentioning any particular works.—E. A. F. In all probability, yes, but I have no record of any electrical disturbance on the 6th ultimo.—Thos. F. Woodhead. A few advertised, but I cannot say if the one described is on sale.

Jupiter. *Vide* text-books on astronomy.—H. M. How does that prove boy not electrified by artificial means?—F. Selby. It has been tried; but no satisfactory arrangement could ever be made.—Iota. (1) As near as I can make out, the next total eclipse visible in England will occur in 2090, shortly before sunset, total only in the south-west counties. As the time draws near, the Editor of Knowledge will give full instructions for observing it. (2) The author of "How to Get Strong" replies that, not being medical, he cannot give advice about preventing "stitch in the side;" but it is seldom noticed except when running or walking after a meal, when it is better to let the stitch prevent exercise, than to take exercise to prevent the stitch.—G. H. S. Dimensions of Martian satellites not known. Periods, 30h. 16m. and 7h. 38m.; distances from centre, 14,530 and 5,800 miles for Deimos (the outer) and Phobos, respectively.—W. Simmons. Thanks; quite agree with you.—Robt. H. Mushens. Thanks; see "Gossip."—R. B. G. Have you tested your theory by a little calculation. The sun illuminates one hemisphere of the moon, *plus*—how much? Answer, a zone a quarter of a degree in width. How wide would this look when near the edge of the lunar disc? Even at the *middle* it would be about a 450th part of the moon's diameter in breadth; near the edge less than the 2,000th part.—T. A. Your position cannot be assailed—by me.—Sidney Tavick. So much more space than can be spared.—Cranleigh. (1) If comets be the fuel of the sun, he needs stoking; (2) Menacing Comet (?) not same as Tewfik's; (3) "If several comets appeared at the same time," two or three would be visible at once. Know of no other consequences; (4) There is but one R. A. Proctor, and he is his own editor.—Dgon Parrie. I certainly am one of the false scientists, if what your friends say is true. We are in a

bad way, you and I. But, supposing we are wrong yet (as we know) honest in our belief, and are to suffer untold pains and penalties for being wrong, then would I, for one, rather submit to such punishment than offer to the Being they describe as so powerful, so unjust, and so cruel—the hideous idol fashioned out of their own heads, and no more holy than any other wooden idol—the unclean sacrifice of a lie. I agree with them pretty nearly in thinking evolution will not be more accepted forty years hence than now; for it cannot be much more fully accepted by all who *know*, and the multitude of those who do not know will be always great. The ignorant, like the poor, we have always with us.—P. A. FOTHERGILL. Thanks; shall appear. How foolish are the prevalent prejudices on the subject!—E. GURNEY, writing on behalf of the Society for Psychical Research, would be obliged if Mr. Sinclair (letter 650) would give him the address of Dr. Goodall Jones, of Liverpool, or enable Mr. Gurney to get first-hand information respecting the interesting case touched on in Mr. Sinclair's letter.—A. N. S. We think with you the passage quoted from De Morgan's letters ambiguous; probably it was meant to be so. In the illustration you give of the syllogism, the inference is fairly drawn from the premisses. If there are as many non-sculptor artists as there are painters (sculptors or otherwise), and some sculptors are painters, there must be non-sculptor artists to match the sculptor painters numerically; as many artists as remain—that is, as many as there are non-sculptor painters—may be painters; but this number among the artists (that is, as many as there are sculptor painters) must certainly not be painters. Put definite numbers, and the matter is simple enough. There are 531 painters and 531 non-sculping artists, and 119 sculptors are painters; then at least 119 artists are not painters, for there are only 412 non-sculping painters, while there are 119 more non-sculping artists.—SENEX. Mr. G. F. Chambers is quite right. Kepler had supposed there could be no transit of Venus in 1639. Horrox took the time of conjunction from Kepler's tables, rejecting Lansberg's; but he inferred a transit from his own observations of Venus, the same which had shown him the worthlessness of Lansberg's tables. —G. ST. CLAIR. What is the theory?—JACOBITE. (1) It was never supposed to be Newton's comet. (2) The changes have arisen chiefly from doubts as to what part was the true nucleus; this misled us all—Hind, Pickering, Smythe, Chandler, and—yours truly. (3) The rapid working of the machine necessitates rapid combustion, therefore quick breathing. (4) Will see about *errata* idea. (5) The cheapest edition of any of my works is that begun in first three volumes of Knowledge Library.—JULES MAGNY. (1) Some of my works have been translated into French, as "Other Worlds than Ours" and "School Star Atlas," by my friend, M. l'Abbé Moigno; but I do not know who are the publishers of the French edition. (2) I do not know the Robertsonian method of learning language.—J. E. CLARK, Bootham, York, would like any information about the meteor (?) seen at 6.10 on Nov. 17; in particular the *place* where "A. G." (letter, p. 431) made his observations.—B. J. S. Difference of distance and of conditions under which seen would account for difference of size.—L. E. MAWER wishes for instructions as to setting a Fitzroy barometer right which has had a fall, air having been thus introduced into the tube.—M. B. A. Astronomy knows nothing yet of condensations from the æther of space.—P. D. I do not myself understand how Mr. W. M. Williams makes out "matter" and "motion" to be convertible terms; it seems to me that "hours" and "boots" are as readily convertible.—ANOTHER OF YOUR SUBSCRIBERS. Your letter forwarded to a telescopic friend.

Our Whist Column.

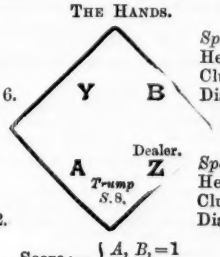
BY "FIVE OF CLUBS."

KEEPING BACK THE BEST OF A PLAIN SUIT.

THE HANDS.

Y.
Spades—6, 5, 4.
Hearts—Kn, 10, 9.
Clubs—Q, Kn, 8.
Diamonds—Q, 8, 7, 6.

B.
Spades—Kn, 9, 3.
Hearts—6.
Clubs—10, 7, 5, 4, 2.
Diamonds—K, 9, 5, 4.



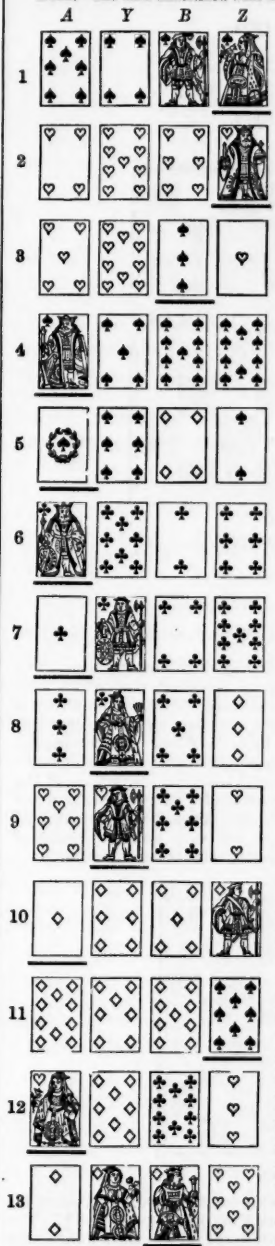
A.
Spades—A, K, 7.
Hearts—Q, 7, 5, 4.
Clubs—A, K, 3.
Diamonds—A, 10, 2.

Z.
Spades—Q, 10, 8, 2.
Hearts—A, K, 8, 3, 2.
Clubs—9, 6.
Diamonds—Kn, 3.

Score:— { *A*, *B*, =1 ; *Y*, *Z*, =0

THE PLAY.

NOTE.—The card underlined wins the trick, and card below leads next round.



MR. LEWIS'S NOTES.

1. With such all-round strength, the trump is the proper lead. It is true that where the lead is not from numerical strength in trumps, the leader declares general strength, and gives the adversaries the opportunity of finessing against him in plain suits. But with such a hand, it is worth while running the risk. If the trump had not been led, *A* must have opened the Heart suit, in which only his partner's weakness (which might have been defeated) could have helped him.

2. *Z* opens a suit of five, headed by Ace, King. Some players, acting upon the analogy of a suit of five headed by the Ace, lead the Ace first. But I do not approve of this play. If the Ace is trumped, the position of the King is unknown. If the King on the second round is trumped, it simulates the lead of Ace, King, only.

4. Although void of Hearts, *B* properly returns the trump. *Z* leads the nine, as the eight was turned.

5. *A* continues trump, satisfied to make his Heart Queen later on. *B* is in a difficulty what to discard. As his partner led from three trumps only, he is uncertain of his suit. He keeps his numerical strength in Clubs.

9. *A* properly refuses to win the trick. With the long trump in *Z*'s hand, he would be freeing his other Hearts.

12. The success of holding back the Queen is now apparent. *A* and *B* win the game.

FORCING.—Speaking of the rule, "When weak in trumps do not force your partner," Col. Drayson makes the following sound remarks:—"It does not mean *never* force your partner if weak in trumps yourself; but it means, if you see a good chance of making more tricks by not forcing your partner than you could make by forcing him, then refrain from the force; but you should always remember it does not follow that your partner *must* take a force, even though you offer it him. He may conclude, and erroneously, that you are strong in trumps; but he would not conclude so unless he were considerably impressed with the importance of the advice, 'do not force your partner if weak in trumps.' Many players, influenced by this recommendation, will frequently throw away a game in consequence of their fertile imagination."

After Dryden.
"Three Pens for three essential virtues famed,
The *Pickwick*, *Owl*, and *Waverley* were named,
The first in flexibility surpassed,
In ease the next, in elegance the last.
These points united with attractions new,
Have yielded other boons, the *Phaeton* and *Hindoo*."

Sample Box, with all the kinds, 1s. 1d. by Post.

"Let those write now who never wrote before;
And those who always wrote now write the more."—*Oban Times.*
Patentees of Pens and Penholders.
MACNIVEN & CAMERON, 33, BLAIR-STREET, EDINBURGH.
PENMAKERS TO HER MAJESTY'S GOVERNMENT OFFICES. Est. (1770.)

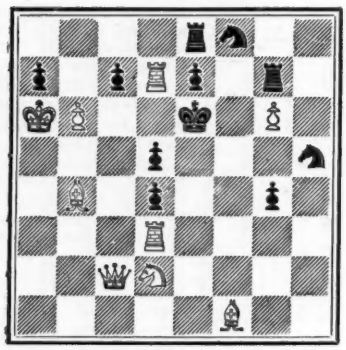
Our Chess Column.

By Mephisto.

PROBLEM No. 66.

By L. P. Rees.

Black.



White.

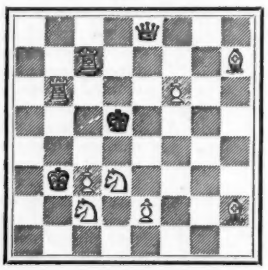
White to play and mate in three moves.

A SELECTION OF 107 CHESS PROBLEMS.

By Francis C. Collins (Wyman & Sons).

We are constantly being asked for good reprint problems, and for books containing the problems of eminent composers, notwithstanding that many of the good composers have published a collection of their problems, the latest of which, as our readers will be aware, is the excellent collection by J. A. Miles. Unfortunately, owing to certain unbusinesslike ways of these amateur authors, these books are not sufficiently brought before the notice of the public; hence they are not able to procure for themselves, at a low price, what to lovers of these problems must be an intellectual treat. The above is a collection of 107 very good problems, of which we select the following ingeniously-constructed puzzle:—

Black.



White.

It will be seen that Black can be mated on the move. The query is: "From which square could the Black King have last moved?" The construction of this problem was rendered all the more difficult by the following condition:—1. The position to admit mate on the move by at least eight different pieces, and at least twenty different ways. It will be found on examination that the author has fulfilled these conditions.

PROBLEM No. 62.

By J. A. Miles, p. 444.

1. Q to R3
2. KKt to Q4
3. Q to B5 or K6 mate.

1. K to K5 or (*a*)
2. K to B5, K4, or Q4

(*a*) 1. K to B3 or (*b*)
2. Q to Q7 mate.

(*b*) 1. K to B5
2. KKt to Q4
3. Q to K6 mate.

SOLUTION OF PROBLEM No. 61.

By L. P. Rees, p. 424.

1. B to Kt8
2. Kt to B3
3. B to K5 mate, or if

1. K to Q5
2. K takes Kt

2. K to B4
3. B to R7 mate.

ANSWERS TO CORRESPONDENTS.

*** *Please address Chess Editor.*

Amateur.—"Cook's Primer" and "Cook's Synopsis."

G. H. Tillard, Francis J. Drake, J. W. Parsons.—Problem received with thanks.

Henry Freeman *v.* H. Jones.

Charles T. Gray.—Your solution of 63 and 64 properly acknowledged; we are at fault about 65, we regret to say this problem is incorrect.

Correct solutions received of C. S. Bright, J. K. Milne. Problem No. 63, of H. Seward, T. T. Dorrington, J. P. No. 64, of H. V. T., J. P. No. 62, W. F. W. Rees.

Herbert Jacobs.—Solutions correct.

C. H. Cope, T. B. S.—Solutions incorrect.

H. V. T.—Solution of Reprint No. 1 correct; in No. 2 the Bishop cannot check on Q7.

Problem No. 64 is to mate in four moves, instead of six, as stated on p. 460.

We are informed that the first reprint problem given on p. 473 is supposed to be the work of the French poet, Alfred de Musset.

A Locomotive Telegraph.—A system for enabling a railway-train in motion to send and receive telegrams was recently tried on the Atlanta to Charlotte aerial railway in America. It is the invention of Captain C. W. Williams, of the United States Army, and consists of a telegraph-wire running along the track, but insulated from it, and interrupted at intervals of 40 ft. The ends at each break are connected to copper rollers which normally are in contact, so that the electric circuit is completed through them. One car of the train is fitted up as a telegraph office, and two long metal strips or rails projecting from below the car rub against the metal rollers as the car passes. In doing so they depress the rollers, thus causing them to break contact with one another. The strips are connected together through the instruments in the car, and the electric current passes from one roller through the instruments to the other roller, and thence pursues its way along the rest of the wire. The circuit through the apparatus thus established is never absolutely interrupted; for, as the car moves from one pair of rollers to the next, the strips make contact with the latter just before contact with the former is broken. The instruments, in fact, are constantly moving along the telegraph line as the train itself moves, and hence a message can be recorded on them or dispatched. Telephones can be used as well as the ordinary Morse and Sounder instruments; and the system enables a passenger to send or receive an important telegram while travelling, or the position and state of the train to be communicated to a distant station.—*The Times*.

NOTICES.

The Star Maps for November and December, 1882, can now be had, price 2d. each, post-free, 2½d.

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